

and West Virginia. 3d, Colorado, Kansas, Michigan, and Nebraska. 4th, Arkansas, Kansas, Nebraska, Texas, Virginia, and Wyoming. 5th, Wyoming. 6th, Minnesota. 7th, Minnesota and New Mexico. 8th, Minnesota and North Dakota. 9th, Illinois, Minnesota, and Nebraska. 10th, Iowa, Missouri, and Washington. 11th, New Hampshire, New Mexico, New York, Oregon, Pennsylvania, and Vermont. 12th, Illinois, New Mexico, North Carolina, Oregon, South Carolina, Tennessee, and Wisconsin.

13th, Alabama, Florida, Missouri, Montana, Nevada, North Carolina, South Carolina, Tennessee, Washington, and Wisconsin. 14th, Colorado, Illinois, Iowa, Kansas, Minnesota, Mississippi, North Dakota, Ohio, South Carolina, South Dakota, Tennessee, Wisconsin, and Wyoming. 15th, Kansas, Michigan, Ohio, Pennsylvania, and Texas. 16th, Indiana, Michigan, Ohio, Texas, and Wisconsin. 17th, Arkansas, Georgia, and Ohio. 18th, Maine, New Mexico, North Dakota, Oregon, South Carolina, and Washington. 19th, Georgia and Oregon. 20th, Indiana, Louisiana, Minnesota, and South

Dakota. 21st, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Carolina, and Wisconsin. 22d, Georgia, Iowa, New York, North Carolina, South Carolina, and Virginia.

23d, Florida, Iowa, Kansas, Michigan, and Minnesota. 24th, Michigan, Ohio, and South Dakota. 25th, Alabama, Colorado, Illinois, Indiana, Kansas, Michigan, Missouri, Nebraska, Ohio, Oklahoma, Pennsylvania, and South Dakota. 26th, Colorado, Illinois, Indiana, Nebraska, North Carolina, North Dakota, Ohio, Oklahoma, South Dakota, Tennessee, Utah, and Virginia. 27th, Arkansas, Florida, Kansas, Montana, Nebraska, New York, and Pennsylvania. 28th, Alabama, Colorado, Georgia, Indiana, Kansas, Nebraska, North Carolina, North Dakota, Ohio, South Dakota, Virginia, West Virginia, and Wyoming. 29th, Colorado, Kentucky, Minnesota, Nebraska, North Dakota, South Dakota, Virginia, West Virginia, and Wyoming. 30th, Arkansas, Colorado, Connecticut, Indiana, Kansas, Minnesota, Missouri, Nebraska, New Hampshire, New York, and South Dakota.

WINDS.

The prevailing winds in June, 1893, are shown on Chart II by arrows flying with the wind.

In the New England and south Atlantic states, the Ohio Valley, and the Lake region the winds were generally from southeast to southwest; in the middle Atlantic states, from north to east; over the Florida Peninsula, from the southeast; in the west Gulf states, the upper Mississippi and Missouri valleys, and on the southeast slope of the Rocky Mountains, from southeast to south; on the northeast slope of the Rocky Mountains, and on the middle Pacific coast, from southwest to northwest; on the middle-eastern slope of the Rocky Mountains, from east to south; over the northern plateau region, and on the north Pacific coast, from south to west; and in the east Gulf states, Tennessee, the Red River of the North Valley, and the southern and middle plateau regions, variable.

HIGH WINDS.

(In miles per hour.)

Wind velocities of 50 miles, or more, per hour were reported at regular stations of the Weather Bureau as follows:

6th, 51, s., at Fort Canby, Wash. 7th, 59, s., at Huron, S. Dak. 9th, 58, s., at Fort Canby, Wash. 10th, 60, s., at Fort Canby, Wash. 11th, 56, sw., at Buffalo, N. Y. 13th, 86, sw., at Pikes Peak, Colo. 14th, 59, s., at Fort Canby, Wash.; 56, s., at Amarillo, Tex. 16th, 55, s., at Southport, N. C.; 54, e., at Charleston, S. C. 21st, 50, nw., at Saint Louis, Mo.; 50, w., at Red Wing, Minn. 22d, 60, w., at Fort Hill, S. C.; 56, s., at Carson City, Nev. 23d, 56, w., at Fort Buford, N. Dak.; 50, se., at Huron, S. Dak. 26th, 60, nw., at Colorado Springs, Colo.; 54, e., at Pueblo, Colo. 29th, 50, w., at Amarillo, Tex. 30th, 54, n., at Little Rock, Ark.

LOCAL STORMS.

(75th meridian time is used at regular Weather Bureau stations.)

1st.—Very heavy rain fell in South Carolina, Georgia, Alabama, Tennessee, and Ohio, and thunderstorms were reported in South Carolina, Ohio, and Michigan. At Columbia, S. C., 2.12 inches of rain fell the night of the 1st. A severe thunderstorm occurred at Longshore, S. C. Exceptionally heavy rain, high wind, and hail were reported at Hephzibah, Ga. Crops on low ground about Newburg, Ala., were damaged by heavy rain. A wind and hail storm at night caused considerable damage near Weatherford, Tex. At Nashville, Tenn., heavy rain, with thunder and high wind, continued during the afternoon and at night; many bridges

were washed away, and much damage was caused to crops on low land. In Noble and Huntington counties, Indiana, a number of buildings were destroyed by high wind. Violent thunderstorms occurred over a large area of Lower Michigan in the evening, causing damage of a minor character.

2d.—Heavy thunderstorms were reported in Georgia, Tennessee, Nebraska, and North Dakota, and severe local storms occurred in Texas. A destructive local storm passed through the southeastern part of Lavaca County, Tex., destroying everything in a path about one-half mile in width and 6 to 8 miles in length. A heavy thunder, rain, and wind storm visited San Antonio, Tex., in the morning. A large waterspout passed over the upper portion of Rio Grande City, Tex. A tornado moved east near Spanish Camp, Tex., between 3 and 4 p. m. The path of the storm was about 50 yards in width. Two persons were killed, and the damage to buildings was placed at \$700.

3d.—Severe thunderstorms were reported in Western New York, the Ohio Valley, Michigan, and Nebraska. At Detroit, Mich., streets and cellars were flooded by heavy rain. A heavy hailstorm of short duration was reported at Hays City, Kans. Damage by high wind and heavy rain was reported at Minneapolis, Kans. Hail caused considerable damage about David City, Nebr. At Omaha, Nebr., several houses were struck by lightning, and damage resulted from heavy rain. A severe thunder, rain, and hail storm moved southeast over Kearney, Nebr., in the afternoon.

4th.—Severe thunderstorms occurred in Maryland, Florida, the Ohio Valley and Tennessee, Missouri, Kansas, Arkansas, and Texas. Several houses were struck by lightning at Knoxville, Tenn. About 1 p. m. a severe thunder and rain storm moved north of east over Saint Louis, Mo., in a path 300 to 500 feet in width and about one-half mile in length, injuring 2 persons and causing considerable damage of a minor character. Near Fort Smith, Ark., a man was killed by lightning.

5th.—Thunderstorms, with heavy rain, occurred in southern New England, eastern New York, and New Jersey. Several buildings were struck by lightning.

7th.—A violent local storm was reported in the afternoon at Morris Island and adjacent islands southeast of Charleston, S. C. At Charleston the rainfall was exceptionally heavy, and a waterspout was observed north-northeast of that station. A severe thunderstorm occurred at Tampa, Fla., in the early morning.

9th.—During a heavy thunderstorm at Chicago, Ill., in the evening, damage was caused by hail, and fire, caused by lightning, destroyed property to the value of \$25,000. A severe thunderstorm visited Omaha, Nebr., in the evening.

10th.—Thunderstorms occurred in northern Illinois and Lower Michigan, and severe wind, rain, and hail storms visited Iowa. Near Kalamazoo, Mich., a man was killed by lightning. Damage by high wind was reported in Harrison and Crawford counties, Iowa. Exceptionally heavy rain caused considerable damage about Dubuque, Iowa.

11th.—Severe thunderstorms occurred in New York. At Albany a church was struck by lightning and damage was caused by wind. Some damage was caused by lightning and hail at Turin, N. Y. A severe southwest gale prevailed at Buffalo, N. Y., in the morning.

12th.—Heavy thunderstorms were reported in eastern New York, the Carolinas, Tennessee, and Missouri. A destructive hail and rain storm moved east over Burgaw, about 25 miles north of Wilmington, N. C., about 4 p. m. Heavy hail was also reported northwest and west of Wilmington. Thunder and hail storms caused some damage about Fort Hill, S. C. A thunderstorm, with heavy rain, occurred at Chattanooga, Tenn., in the afternoon. A heavy hailstorm was reported northeast of Chattanooga. The path of the hailstorm was about 3 miles in length and one-half mile in width. Crops were damaged by hail near Golconda, Ill. A severe thunderstorm occurred at Saint Louis, Mo., in the afternoon.

13th.—Hail damaged crops about Newnan, Ga. At Genoa, Ill., a residence was struck by lightning. Damage by hail was reported at Hillsboro, Wis. Heavy rain caused damage about Palmyra, Mo. At night damage of a minor character was caused by lightning at Rapid City, S. Dak.

14th.—Destructive hailstorms occurred in Illinois, and thunderstorms were reported in Wisconsin, Missouri, the Missouri Valley, and Wyoming. Hail caused great damage to crops about Wayland, Ill. Damage by hail and wind was reported at Lancaster, Wis.

15th.—Thunderstorms were reported in Lower Michigan, Ohio, Iowa, and Florida. A severe thunder and hail storm visited Ann Arbor, Mich. At Hastings, Mich., two persons were struck by lightning. In Ohio several buildings were struck by lightning, and damage was caused by hail. A man was killed by lightning near Newton, Iowa. A heavy rain and wind storm prevailed over the east Gulf and along the south Atlantic and Florida coasts, causing considerable damage to crops. At Jacksonville, Fla., a thunderstorm about noon was followed by high wind and heavy rain. At Tampa, Fla., the wind reached a velocity of 36 miles per hour from the south at noon, and wharves along the bay and river front were submerged.

16th.—Heavy rain and high winds prevailed along the middle Atlantic and Carolina coasts. At Eden Center, N. Y., a house was struck and one person was killed by lightning. High wind caused some damage along the New Jersey coast, and exceptionally heavy rain and high winds occurred along the Virginia coast. At Wilmington, N. C., the maximum wind velocity was 36 miles per hour from the southeast. A severe thunderstorm visited Corpus Christi, Tex., in the afternoon. A destructive local storm was reported at Laredo, Tex., in the morning. Heavy thunderstorms were noted in Ohio and Lower Michigan.

17th.—A man was killed by lightning near Holly Springs, Miss.

18th.—Destructive hailstorms were reported at Mattawamkeag, Me., and Gallinas Spring, N. Mex.

19th.—A severe hailstorm occurred near Marietta, Ga. At Saint Louis, Mo., a thunderstorm from the southeast began 5.18 and ended 7.15 p. m. In the suburbs the storm was very severe; trees 6 to 8 inches in diameter were broken off, a horse

was killed by lightning, and a house was struck by lightning and burned.

20th.—A house was struck by lightning at Little Rock, Ark. Stock was killed by lightning at Springfield, Ill., and Kokomo, Ind. A heavy hailstorm was reported south of Webster, S. Dak.

21st.—Heavy thunderstorms occurred in Florida, Kentucky, Lower Michigan, Wisconsin, and Minnesota, and severe local storms were reported in Iowa, Missouri, and Kansas. At Manatee, Fla., a house was struck by lightning. A building was struck by lightning at Tampa, Fla. Between 4.30 and 5 p. m. a heavy thunder, rain, and hail storm moved northeast south of Adair, Iowa. The path of the storm was 200 to 400 yards in width. Buildings valued at \$6,000 to \$7,000 were destroyed. A thunderstorm, with heavy rain, moved southeast over Anita, Iowa, between 5 and 6 p. m. A windstorm visited Clinton, Iowa, from 7.30 to 9 p. m. A severe thunderstorm moved southeast over Conception, Mo., about 4.30 p. m., destroying small buildings and killing three persons. Estimated value of property destroyed at Conception, \$30,000. Damage was caused by high wind, hail, and heavy rain about New Palestine, Akron, Miami, New Boston, Rea, and Sublette, Mo. At 6.30 p. m. a tornado moved northeast in a path about 200 yards in width and over four miles in length near Williamstown and Perry, Kans., killing 10 persons, and destroying property valued at \$20,000. Heavy rain fell before and heavy thunder followed the passage of the storm. A severe thunder, rain, and hail storm moved south over Winfield, Kans., about 8 p. m., destroying property to the estimated value of \$25,000.

22d.—Thunderstorms, with heavy rain, occurred in the middle and south Atlantic and south New England states and the Ohio Valley. In parts of Virginia, the Carolinas, and Georgia the storms were attended by hail. At Dallas, Ga., a thunder, rain, and hail storm moved east at 2.30 p. m., unroofing 12 buildings. Near Parkersburg, W. Va., a man was killed by lightning.

23d.—Local storms occurred in Kansas and western Iowa. At Concordia, Kans., exceptionally large hail fell in the late afternoon. The larger stones measured 13 to 16 inches in circumference. Hail damaged corn and small grain in the northwest part of Guthrie County, Iowa. A severe thunderstorm occurred at Columbia, Mo., at night.

25th.—Thunderstorms occurred in Pennsylvania, the Ohio Valley and Tennessee, and Missouri. Fruit was damaged by hail about Erie, Pa. Hailstorms were also reported at Edinboro and Grampian, Pa. Destructive hailstorms were reported at Warren and Colebrook, Ohio. Hail was also reported at Steffenville and Gainesville, Mo.

26th.—In the early morning several houses in Atlanta, Ga., were struck by lightning. A thunderstorm and cloudburst occurred at Lebo, Kans., between 12.40 and 3.50 p. m. 8.23 inches of rain fell, flooding fields. A severe thunder and hail storm was reported at Kennedy, Nebr. In the evening the wind reached a velocity of 60 miles per hour from the northwest at Colorado Springs, Colo.

27th.—Thunder and hail storms occurred in Florida. A severe thunder and wind storm passed about 12 miles southwest of Beaver City, Nebr.

28th.—Destructive thunder and hail storms were reported in Virginia, West Virginia, North Carolina, Ohio, North Dakota, and Nebraska.

29th.—Hailstorms were reported in Virginia, Kentucky, Colorado, and Wyoming, and thunderstorms occurred in Florida, Minnesota, and Nebraska. At Pensacola, Fla., a house was struck by lightning. A man was killed by lightning near Willmar, Minn. Hail damaged crops about Table Rock, Colo., and Sheridan, Wyo.

30th.—Thunderstorms occurred in New England, and

hailstorms in Connecticut and New Hampshire. At South Weathersfield, Conn., a severe hailstorm occurred about 3 p. m. Some damage by hail was reported at Littleton, N. H. A boy was killed by lightning near Gloversville, N. Y. A heavy thunder and rain storm occurred at Jupiter, Fla., in

the afternoon. During a thunderstorm in the evening at Little Rock, Ark., the wind reached a velocity of 54 miles per hour. A severe thunder, rain, and hail storm visited Concordia, Kans., in the morning. Thunderstorms were reported in Missouri and South Dakota.

INLAND NAVIGATION.

FLOODS.

The month opened with the Mississippi River above the danger-line from Helena, Ark., southward. At Vicksburg, Miss., the stage of water, 46.7 feet, was the highest noted for the month. At Nashville, Tenn., the Tennessee River rose rapidly and reached 19.4 feet on the gauge, a rise of 9.1 feet in 24 hours. At Cairo, Ill., the Ohio River was rising slowly and passed the danger-line by the morning of the 2d. The Ohio River continued to rise at Cairo until the 6th, when a stage of 43.3 feet, 3.3 feet above the danger-line was reached. The Mississippi River passed the danger-line at Memphis, Tenn., on the 7th, and the maximum stage of the month at that point, 33.5 feet, was noted from the 11th to the 14th. On the 13th a small break occurred in the Magnolia Mound levee near Baton Rouge, La.; the break was closed by the night of the 13th. On the 16th a crevasse was reported near Napoleonville, Assumption Parish, La. The evening of the 18th a break occurred in the levee on the Reserve plantation at Saint Peters, La. The night of the 18th a break occurred in the levee at Convent, La. By the 22d the Reserve crevasse had been closed. The evening of the 23d a serious crevasse occurred in front of the Rescue plantation on the left bank of the river about one mile above Ascension Parish. The Rescue crevasse increased in width during the 24th and 25th, and caused a gradual fall in the river below that point. At New Orleans, La., the water, which reached a stage of 17.9 feet the evening of the 23d and continued nearly stationary until noon of the 24th, fell one foot by the close of the month.

STAGE OF WATER IN RIVERS.

The following table shows the danger-points at the various river stations; the highest and lowest stages for the month, with the dates of occurrence; and the monthly ranges:

Heights of rivers above low-water mark, June, 1893.

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Height.	Date.	Height.	Date.	
<i>Red River.</i>	<i>Feet.</i>	<i>Feet.</i>		<i>Feet.</i>		<i>Feet.</i>
Shreveport, La.	29.2	21.8	16-17	14.8	30	7.0
<i>Arkansas River.</i>						
Fort Smith, Ark.	22.0	16.8	2	4.0	27	12.8
Little Rock, Ark.	23.0	21.5	3	7.3	30	14.2
<i>Missouri River.</i>						
Fort Buford, N. Dak.	25.0	16.3	17	10.8	1-3	5.5
Bismarck, N. Dak.	75.0	11.6	18	5.5	4.5	6.1
Pierre, S. Dak.	13.0	7.8	21, 26	0.4	12, 13	7.4
Sioux City, Iowa.	18.7	14.1	22	9.7	12, 13	4.4
Omaha, Nebr.	18.0	12.9	23, 24	8.9	14, 15	4.0
Kansas City, Mo.	21.0	17.2	26	12.2	19	5.0
<i>Mississippi River.</i>						
Saint Paul, Minn.	14.0	9.5	1	4.4	30	5.1
La Crosse, Wis.	10.0	10.0	1, 2	4.6	30	5.4
Dubuque, Iowa.	16.0	12.9	2, 4, 5	6.0	30	8.9
Davenport, Iowa.	15.0	10.4	1	4.4	30	6.0
Keokuk, Iowa.	14.0	12.2	1	5.5	30	6.7
Hannibal, Mo.	17.0	14.0	1	7.0	30	7.0
Saint Louis, Mo.	30.0	26.0	4	17.6	23	10.4
Cairo, Ill.	40.0	43.3	6	21.0	26	22.3
Memphis, Tenn.	33.0	33.5	11-14	16.5	29	17.0
Vicksburg, Miss.	41.0	40.7	1	42.3	30	4.4
New Orleans, La.	13.0	17.9	24	16.0	4	1.9
<i>Ohio River.</i>						
Parkersburg, W. Va.	38.0	9.5	7	4.6	18	4.9
Cincinnati, Ohio.	45.0	21.0	5	10.2	19	10.8
Louisville, Ky.	24.0	10.0	7	5.4	20	4.6
<i>Cumberland River.</i>						
Nashville, Tenn.	40.0	32.0	2	3.8	30	28.2
<i>Tennessee River.</i>						
Chattanooga, Tenn.	33.0	20.7	8	4.1	30	16.6
Knoxville, Tenn.	29.0					
<i>Monongahela River.</i>						
Pittsburg, Pa.	22.0	7.1	30	2.2	13	4.9
<i>Savannah River.</i>						
Augusta, Ga.	32.6	13.5	8	6.5	30	7.0
<i>Willamette River.</i>						
Portland, Oregon.	15.0	22.0	15	18.0	29, 30	4.0
<i>Susquehanna River.</i>						
Harrisburg, Pa.	17.0	3.7	1, 2	1.6	22, 23	2.1
<i>Alabama River.</i>						
Montgomery, Ala.	48.0	21.3	8	4.2	26	17.1
<i>Jones River.</i>						
Lynchburg, Va.	18.0	5.5	3, 4	0.7	30	4.8
<i>Sacramento River.</i>						
Red Bluff, Cal.	22.0	4.9	1	2.3	30	2.6
<i>Des Moines River.</i>						
Des Moines, Iowa.	19.0	6.7	12	4.0	30	2.7

* For 29 days.

ATMOSPHERIC ELECTRICITY.

THUNDERSTORMS.

Description of the more severe thunderstorms reported for the month is given under "Local storms."

Thunderstorms were reported as follows: East of the Rocky Mountains they were reported in the greatest number of states, 33, on the 3d and 21st; in 32 on the 4th; in 31 on the 30th; in 20 to 30 on the 1st, 2d, 5th, 6th, 10th to 17th; 19th, 20th, 22d, and 25th to 29th; and in 10 to 19 on the 7th, 8th, 9th, 18th, 23d, and 24th.

East of the Rocky Mountains thunderstorms were reported on the greatest number of dates, 29, in Florida; on 20 to 28 in Colorado, Georgia, Illinois, Iowa, Kansas, Louisiana, Michigan, Missouri, New York, North Carolina, North Dakota, Ohio, Pennsylvania, South Carolina, South Dakota, Tennessee, Texas, Virginia, and West Virginia; and on 10 to 19 in Alabama, Arkansas, Connecticut, Indiana, Kentucky, Maryland,

Massachusetts, Minnesota, Mississippi, Nebraska, New Hampshire, Vermont, and Wisconsin. The only states in which thunderstorms were reported on less than 10 dates were New Jersey on 8 dates, the District of Columbia and Montana on 7, Oklahoma on 6, Rhode Island on 4, and Delaware on 3.

West of the Rocky Mountains thunderstorms were reported in Arizona on the 7th, 8th, 9th, 18th, 24th, 25th, 26th, and 30th; in California on the 21st; in Idaho on the 22d and 27th; in Nevada on the 12th and 13th; in New Mexico on the 7th, 12th, 17th, 18th, and 25th; in Oregon on the 6th, 11th, 21st, 22d, 24th, and 27th; in Utah on the 13th, 25th, and 26th; in Washington on the 3d, 5th, 6th, 10th, 18th, and 24th; and in Wyoming on the 4th, 5th, 14th, and 26th to 29th. There were no states or territories in which thunderstorms were not reported.

AURORAS.

Auroras were reported as follows: 2d, Glenwood, Nebr.